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Thelenella haradae sp. nov., a saxicolous lichen from South Korea

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Abstract—A new species of saxicolous lichen is described, and named as *Thelenella haradae*. It occurs on exposed granite rocks of Mt. Daebang, Gyeongnam Prov., southern maritime Korea, and is similar to *T. brasiliensis* but differs in having wider ascospores (25–30 × 13–17 μm) and completely immersed ascomata.

Key words—East Asia, lichenized ascomycetes, biogeography, taxonomy

Introduction

During examination of pyrenocarpus lichens deposited in KoLRI herbarium (Sunchon Nationbal University), a new species of *Thelenella* from Korea was discovered.

The genus *Thelenella* Nyl. (*Thelenellaceae*) consists of 35 corticolous, foliicolous, muscicolous, or saxicolous taxa and is characterized by a crustose thallus with a chlorococcoid photobiont and immersed ascomata usually lacking an involucrellum (Mayrhofer 1987, Morse 2016). Most saxicolous *Thelenella* species are limited to maritime or oceanic climates and non–calcareous substrata (with one exception, *T. calcicola* C.A. Morse; Morse 2016). *Thelenella modesta* (Nyl.) Nyl. has recently been reported from Korea (Aptroot & Moon 2014). We now present a second record for the country, here described as *Thelenella haradae*.

Materials & methods

The specimen was collected from southern part of Korea in 2011 and deposited in the lichen herbarium of the Korean Lichen Research Institute, Suncheon, Korea

(KoLRI). The specimen was examined morphologically and sections were made by razor blade under an Olympus SZX–7 stereomicroscope. The thin hand-cut sections of thallus and ascomata were mounted in tap water and examined anatomically using an Olympus BX50 compound microscope with DIC optics connected to a Canon 5D digital camera. All measurements were made in water, but sections of ascomata or pycnidia were mounted in 10% aqueous solution of KOH for observing asci and ascospores in more detail. Ascospores were measured, and mean length and width values ± standard deviations and mean length/width ratio were calculated. The methodology for colour spot reaction tests and thin layer chromatography (TLC) followed Orange et al. (2010).

Taxonomy

Thelenella haradae J. Halda, Xin Y. Wang, J.A. Ryu & Hur, **sp. nov.** Pl. 1

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Differs from *Thelenella brasieliensis* by its completely immersed ascomata and wider ascospores.

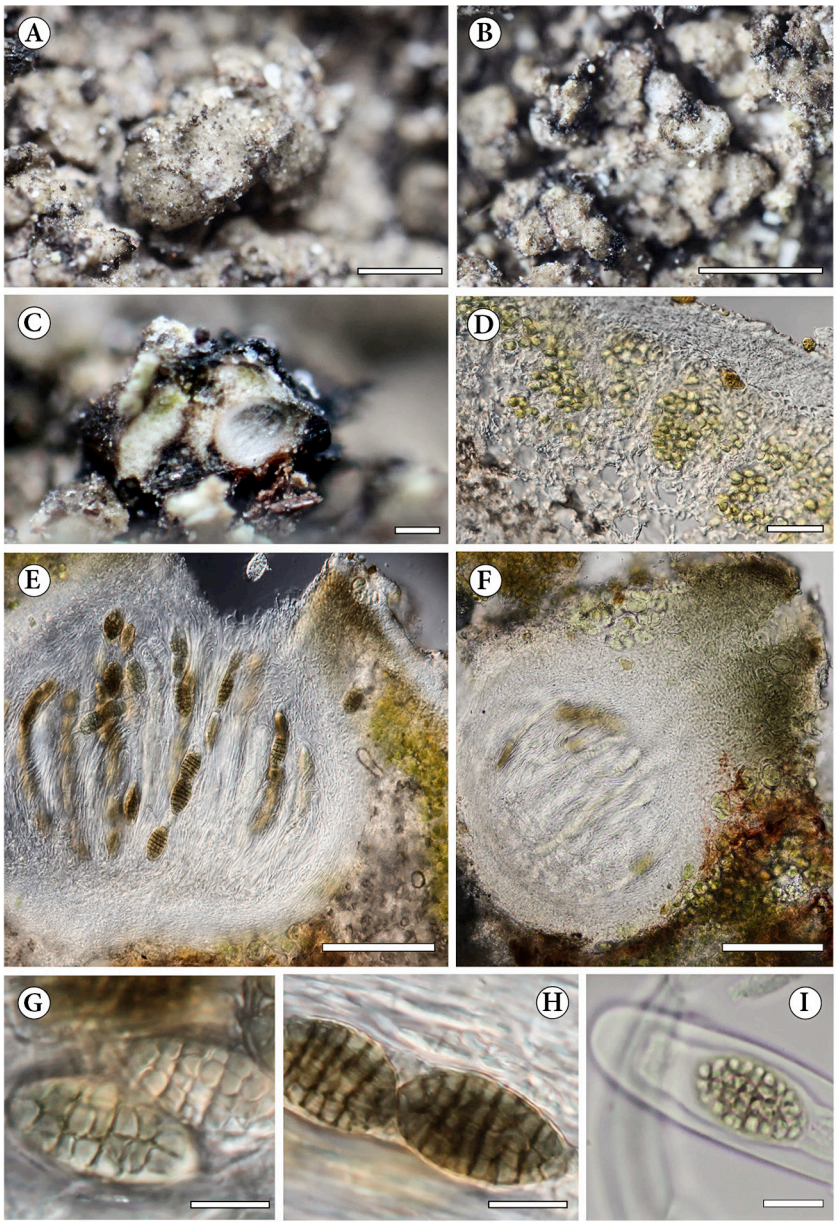
Type: South Korea, Gyeongnam Prov., Namhae County, Mt. Daebang, 34°51′00″N 127°59′26″E, alt. 87 m, on vertical face of an exposed granite rock, 29 April 2011, X.Y. Wang & J.A. Ryu 110271 (**Holotype**, KoLRI 13485).

Etymology: The new species is named in honor of the well-known Japanese lichenologist Dr. H. Harada for his numerous contributions to our knowledge of pyrenocarpous lichens in East Asia.

Thallus lichenized, epilithic, 2–5 mm diam., 400–600 µm thick, gray to gray-green, smooth, ± glossy, verrucose to subsquamulose, thick, with prominent brown hypothallus. I–, KI–, composed mostly of oblong to spherical hyphae (ca. 5–8 µm diam.) and partly of linear hyphae (especially in the basal parts). Epinecral layer well-developed, ca. 20 µm thick, hyaline, composed of horizontally flattened hyphal remnants. Cortical layer 60–80 µm thick, plectenchymatous, composed of hyphae 1.5–2 µm diam., colourless. Photobiont layer continuous, 40–60 µm thick. Medulla often present, white, 40–100 µm high. Photobiont cells of trebouxioid green algae mostly 7–10 µm diam., usually in vertically oriented clusters.

Ascomata perithecioid (pseudothecial), oval to pyriform, 350–400 µm tall, 300–350 µm broad, without involucrellum, completely immersed in thalline warts; the warts 0.5–1 mm across, usually with several perithecia, dome-shaped to hemispherical, the same colour as surrounding thallus, colourless to brown in upper parts around ostiola. Ostiolum not visible on

Plate 1 (right). *Thelenella haradae* (holotype, KoLRI 13485). A, thalline warts with ascomata; B, subsquamulose thallus; C, cross section of thalline wart with ascoma; D, cross section of thallus with upper epinecral layer, cortical layer, and medulla; E, cross section of ascoma showing perithecial wall structure, hamathecium, asci with ascospores, and anastomosing paraphysoids



(mounted in water); F, cross section of ascoma with detail of ostiolum; G, H, young and mature ascospores; I, apical part of non-amyloid ascus with a young ascospore. Scale bars: A = 1000 µm; B = 500 µm; C, E, F = 100 µm; D = 50 µm; G–I = 10 µm.

the thallus surface, pale brown in upper part. Excipulum grayish to brownish in the upper parts, hyaline below, 25–30 µm thick in sides, 40–50 µm at base; subhymenium concave above, 20–30 µm thick at base. Hymenium 300–320 µm high and 250–280 µm wide. All hymenial elements I–, KI–. Periphyses absent, pseudoparaphyses septate, branched and anastomosing to form a network, even in thickness (1 µm). Asci clavate, fissitunicate; endotunica universally thick, lacking prominent ocular chamber, cylindrical, 8-spored, 80–100 × 12–15 µm. Ascus apices thickened, non-amyloid, bilabiate (for terminology see Eriksson 1981).

Ascospores uniseriate, rarely biseriate in the ascus, (22–)25–30(–33) × (10–)13–17(–17) µm [means = 27.2 ± 2.5 × 14.5 ± 1.8 µm (n = 56); l/w ratio = 1.9], broadly ellipsoidal to oval, colourless at first, dark in maturity, muriform (with 7 transverse and 2–3 longitudinal septa, 25–35 visible cells), lacking perispore.

Pycnidia not seen in thalline warts and thallus sections.

Ecology & distribution: *Thelenella haradae* is known only from the type locality, Mt. Daebang, on an island off the southern coastline of the Korean Peninsula, where it grows at low elevation on the vertical surface of exposed rock (granite), together with *Xanthoparmelia* sp.

Comments—*Thelenella luridella* (Nyl.) H. Mayrhofer, known from Japan (Harada 1999), differs from *T. haradae* by its colourless ascospores, its black perithecial ostioles visible on thalline warts, the presence of pycnidia, and the lack of a hypothallus. *Thelenella melanospora* Etayo & H. Mayrhofer, described from Spain (Etayo & Mayrhofer 2003), differs by its smaller (18–22 × 9–12 µm) ascospores, its paler coloured hypothallus, and its different substratum (smooth bark of shrubs or small trees). *Thelenella fernandeziana* (Zahlbr.) H. Mayrhofer, described from Juan Fernandez Islands (Mayrhofer 1987), differs by its ascomata with dark pigmented ostiolum and its longer (30–45 × 15–22 µm) ascospores; and *T. brasiliensis* (Müll. Arg.) Vain., known from tropical South and Central America, Africa, and China, differs by its narrower ascospores (20–32 × 9–13µm) and its emergent ascomata with a pale brown ostiolum (Mayrhofer 1987).

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